FY 2019 Competition Information Sheet

Program Name

Modeling, Analysis, Predictions, and Projections (MAPP) Program.

Program Mission

The mission of the Modeling, Analysis, Predictions, and Projections (MAPP) Program is to enhance the Nation's capability to predict variability and change in Earth's climate system. The MAPP Program focuses on the coupling, integration, and application of Earth System models and analyses across NOAA, among partner agencies, and with the external research community. Primary objectives include: 1) improving Earth System models; 2) supporting an integrated Earth System analysis capability; 3) improving methodologies for global to regional-scale analysis, predictions, and projections; and 4) developing integrated assessment and prediction capabilities relevant to decision makers based on climate analyses, predictions, and projections.The MAPP Program sits within the Earth System Science and Modeling Division of the NOAA Office of Oceanic and Atmospheric Research (OAR) Climate Program Office (CPO).

Focus for FY19

21st Century Integrated U.S. Climate Predictions and Projections

Proposals may target only one of the FY 2019 MAPP competitions, which must be clearly identified in the proposal summary.

Funding for FY19

Pending the availability of funds in FY 2019, the MAPP program anticipates a funding allocation of $1,000,000 for this competition. Total funding for this competition may exceed this amount, depending on partners' contributions.

Proposals may be for up to two years, up to $100,000/year per Type I projects and up to $250,000-300,000/year for the Type II project (only one Type II project may be funded; see below for project type definition). A total of 7-10 projects may be funded; this number may be exceeded depending on partners' contributions. The MAPP program envisions working with partners at NOAA and outside to co-fund new awards. NOAA partners include the Climate Program Office/Assessments Program. Additional partners are sought in the public sector (federal, state and local level), academia, non-profit organizations and commercial entities. Non-federal co-funding partners will be asked to enter a Memorandum of Understanding with NOAA which will detail co-funding terms. Prospective partners should contact Annarita Mariotti (annarita.mariotti@noaa.gov) for more information.

Competition Information

Title: 21st Century Integrated U.S. Climate Predictions and Projections

Preparedness for changing climate conditions crucially depends on our ability to characterize future changes and how they will collectively affect the environment for specific U.S. regions and sectors. This involves capturing the **combined effect** of a variety of changes in the Earth's climate system and also adequately characterizing associated uncertainties. For example, characterizing long-term changes in weather extremes and sea level, which jointly affect the likelihood of U.S. coastal floods; changes in temperature and precipitation patterns which jointly affect land ecosystems; heat waves occurrence and precipitation changes which jointly affect drought, fire occurrence, and air quality, as well as ocean environments; changes in snowmelt accumulation and weather patterns which impact U.S. water resources; U.S. Arctic permafrost and sea ice cover which affect ecosystems, infrastructure and navigation. Supporting high priority NOAA-relevant sectors such as the U.S. Blue Economy[1],[2] will involve depicting the combined changes in temperature, precipitation, sea level and ice-cover among others. Furthering the understanding and modeling of such climate changes crucially underpins any substantive advancement in our predictive capabilities of future environmental conditions, as the basis of enhanced U.S. climate planning and adaptation[3].

The international Coupled Model Intercomparison Project - Phase 6 (CMIP6)[4] is engaging the scientific community in a massive multi-year endeavour to better understand changing climate conditions and underpinning processes in a multi-model context. CMIP6 builds on decades of research and development in the scientific community, including at NOAA's Office of Oceanic and Atmospheric Research (OAR) Laboratories. CMIP6 represents an opportunity to improve the characterization of future U.S. climate and related environmental impacts, building on the latest models and deepened understanding of underpinning processes and associated uncertainties. US modeling centers and the scientific community are actively engaged in CMIP6[5] and there is the opportunity to build on these activities to improve twenty-first century predictions and projections of U.S. climatic and related environmental conditions.

In FY 2019, the OAR/Climate Program Office (CPO) MAPP Program in partnership with

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[1] NOAA Fisheries Climate Science Strategy: https://www.st.nmfs.noaa.gov/Assets/ecosystems/climate/documents/Climate_Science_Strategy_highlights_web-display.pdf

[2] NOAA by the Numbers, 2018: http://www.performance.noaa.gov/wp-content/uploads/NOAA-by-the-Numbers-06122018.pdf;NOAA Report on the U.S. Ocean and Great Lakes Economy, 2018: https://coast.noaa.gov/data/digitalcoast/pdf/econ-report.pdf

[3] Climate Science Special Report: https://science2017.globalchange.gov/; National Climate Assessment: https://nca2014.globalchange.gov/

[4] CMIP6: https://www.wcrp-climate.org/wgcm-cmip/wgcm-cmip6

[5] US Climate Modeling Summit - 2018 https://www.globalchange.gov/sites/globalchange/files/4th_USCMS_agenda_fnl.pdf

CPO's Assessments Program solicit research investigations that build on CMIP6 results for improved depictions of 21st century climate over the United States[6]. Proposals can focus on one or more of the Priority Areas A-C below:

A. Develop integrated predictions/projections of long-term climate changes affecting the U.S. within the global context at national or large regional scale[7], and/or for specific applications.
B. Develop integrated process-level understanding of predicted/projected climate changes (as in Priority Area A) for the purpose of characterizing associated confidence and uncertainties.
C. Develop indicators of predicted/projected 21st century U.S. climate changes in support of National Climate Assessment (NCA) activities.

Proposals will leverage CMIP6 modeling experiments and related scientific activities to address the goals of this solicitation. Additional limited modeling experiments may be proposed, if duly justified (NOAA HPC resources may be available, see below). Model development activities are outside the scope of this solicitation.

Proposals that address Priority Area A will utilize CMIP6 results considering the combination of major climate factors at play at national or large regional scale (at the scale of NCA regions), and/or for specific applications, such as the Blue Economy sector and underpinning ocean health. Proposed work should go beyond assessing changes in individual climatic quantities or phenomena and instead consider the combined changes of multiple major climate factors on a selected region and/or application (e.g. changes in weather extremes and sea level, which jointly affect the likelihood of U.S. coastal floods; see opening paragraph for more examples). Proposals will develop/apply innovative methodologies (e.g. machine learning, model-observation fusion methodologies, model ensemble calibration, etc.) to advance beyond our current understanding and characterization of future climate changes. Work should focus on projections that are of demonstrated high relevance for the goals of the proposed work (e.g. by integrating relevant thresholds). Proposals will consider changes over different future time horizons and identify time horizons for changes beyond a given threshold of relevance to the targeted application. Proposals will demonstrate the suitability of CMIP6 model results for proposed goals.

Proposals that address Priority Area B will assess how models capture processes that underpin combined predicted/projected climate changes for the purpose of defining confidence in the projections. More generally, proposals will develop/apply methodologies to associate uncertainties to the projections. Proposals that target process understanding per-se without translating this into estimates of confidence/uncertainties are outside the scope of this solicitation.

[6] This includes U.S. states, its territories and affiliated islands

[7] At the scale of National Climate Assessment regions: https://www.globalchange.gov/files/nca4-regionsjpg

Proposals that address Priority Area C will consider existing observationally-based indicators associated with the National Climate Assessment[8], and will propose methodologies to develop future CMIP6-based projections and associated uncertainties for those indicators and/or will propose new indicators of combined climatic effects with suitable availability of constraining observational and projection data. Proposers should expect to refine and adjust their proposed methodologies and objectives via interactions with the NCA Indicator Working Group (see contact below), as appropriate.

Investigators addressing more than one Priority Area A-C as part of their proposal, should clearly identify tasks and costs that directly address each Priority Area.

Across Priority Areas A-C, Investigators are strongly encouraged to consider how their proposed work builds on and extends research and development work at NOAA OAR Laboratories to enhance outcomes. Proposers are also strongly encouraged to consider relevance to the mission of the NOAA Service Line Offices. Proposers are also encouraged to estimate the economic value of the enhanced climate information developed as part of their project, as feasible.

Projects selected for funding will be coordinated via a MAPP Task Force which Investigators will contribute to with their projects. The Task Force will facilitate communication, coordination and synthesis of results to optimize outcomes. The Task Force will coordinate with other relevant activities at NOAA, as part of US Global Change Research Program and World Climate Research Program, for example to inform future reports such as the Climate Science Special Report.

Proposals may be for two types of projects:

- Type I Projects will address one or more of Priority Areas A-C and will contribute with their project to MAPP Task Force activities (above).
- Type II Project (only one will be funded) will have same scientific objectives as Type I Projects, will address at least two Priority Areas A-C, and will also lead and coordinate the planned MAPP Task Force. Type II proposals should clearly separate scientific tasks and Task Force leadership/coordination activities, detailing plans and costs for each. The goal of the proposed leadership/coordination activities will be to integrate research from Type I proposals to optimize the outcomes of this research initiative. This will include facilitating the exchange of information/practices among Investigators; synthesis of new results and methodologies (e.g. special journal collections, topical reports, workshops); communication with relevant external entities; and demonstrating how research projects yield result that are of relevance to target regions and sectors.

MAPP Competition Manager and Assessments Program Point of Contact: Daniel Barrie (daniel.barrie@noaa.gov)
MAPP Program Director: Annarita Mariotti (Annarita.mariotti@noaa.gov)

[8]NCA indicators: https://www.globalchange.gov/browse/indicators

Additional General Guidelines for Applicants

- Principal Investigators submitting a proposal in response to this MAPP Announcement are required to follow the Letters of Intent (LOI) and Proposal preparation and submission guidelines described in the Climate Program Office FY 2019 Federal Funding Opportunity announcement.
- Investigators are strongly encouraged to submit an LOI prior to developing and submitting a full proposal using the FY19 MAPP Letter of Intent submission form[9]; investigators unable to submit via the form should email their LOI to oar.cpo.mapp@noaa.gov. Investigators will be notified by the MAPP Program Competition Manager as to whether a full proposal is encouraged based on the LOI within 30 days of the LOI due date.
- Proposals must clearly identify in their summary which MAPP competition is being targeted (only one competition may be targeted by a given proposal) and which sub-element of the competition is being targeted, if applicable.
- Administrative questions regarding the Federal Funding Opportunity (e.g. proposal formatting or submission guidelines) should be directed to Diane Brown (diane.brown@noaa.gov).

A webinar will be offered to potential applicants for background on the MAPP program and this solicitation soon after publication of this announcement. For Information on webinar timing and registration procedures please check the MAPP website[10]; prior to when the webinar is held, potential applicants can also sign-up to receive an email notification[11].

Data Archiving and Computational Resources

Computational Resources

Computational resources on NOAA's high-performance computing platforms may be requested for research sponsored as a result of this solicitation. Proposals should indicate the availability of alternative computing resources should NOAA resources not be available for the project. Proposers who choose to request computational allocations on NOAA's platforms must include in their proposal a request describing the computational resources and data storage required, as well as a description of how they will port their methodology to the NOAA

[9]Note, a Google account is needed to submit via this LOI submission form: https://docs.google.com/forms/d/e/1FAIpQLSfrveTEkW_f6E06PvD4RjziGh9KtyXomjFKB61KOwL7pV6rLw/viewform

[10]MAPP website: https://cpo.noaa.gov/MAPP

[11]MAPP Webinar sign up prior to when the webinar is held: https://docs.google.com/forms/d/e/1FAIpQLScoswYBrwTxvjNseONZ5HD3MEP8gbg8yPN19gdEVp3WTYdbUA/viewform

platforms. Proposers must submit an HPC Request Form with their proposal in order to apply for computational resources[12].

Questions regarding the use of NOAA's high-performance computing platforms should be directed to Dan Barrie (daniel.barrie@noaa.gov).

Data Management Guidance

The MAPP Program requires that all products and deliverables produced via solicitation will reside in the open access / open source domain, freely available to the public.

Public access to grant/contract-produced data will be enabled in one of the following ways (select one):

- ❑ Funding recipients are planning to submit data to NOAA National Centers for Environmental Information (NCEI), which will provide public access and archiving[13]. Point of Contact for NCEI is Nancy Ritchey (Nancy.Ritchey@noaa.gov)
- ❑ Data are to be submitted to an International Council for Science (ICSU) World Data System facility: https://www.icsu-wds.org/community/membership/regular-members)
- ❑ An existing publicly accessible online data server at the funded institution is to be used to host these data (describe in proposal).

The Competition Manager (above) is the responsible NOAA Official for questions regarding this guidance and for verifying accessibility of data produced by funding recipients.

[12] https://cpo.noaa.gov/Portals/0/Docs/MAPP/MAPP_FY19_HPC_Request_Form.docx

[13] NCEI supports the creation of adequate metadata and data ingest into long term repository holdings using tools such as Send2NCEI (www.nodc.noaa.gov/s2n, for small volume, one-time only data collections) and Advanced Tracking and Resource tool for Archive Collections or ATRAC (www.ncdc.noaa.gov/atrac, for recurring and/or large volume data collections).